

Preliminary Classification of
Shinnery Oak Communities in Southeastern New Mexico
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Classification is defined as the grouping or clustering of objects based upon their resemblance. In ecology, Gauch (1982) recognized three purposes for classification: to summarize large, complex sets of data, to aid in environmental interpretation of patterns of community variation, and to refine models of community structure. Several strategies have been developed for classifying communities, however, a complete description of each of these is beyond the scope of this report. The reader is referred to excellent reviews of classification strategies and theory by Whittaker (1978), Gauch (1981), Ratliff and Pieper (1982), and Ludwig and Reynolds (1988).

The objective of this study was to develop a vegetation classification of shinnery oak communities in southeastern New Mexico. The vegetation key and legend described herein is preliminary and subject to revision upon further computer analysis of field data.

Classification of Shinnery Oak Vegetation

Shinnery oak communities have variously been described and classified across their range. In Oklahoma, Wiedeman and Penfound (1960) described a "shin" oak complex dominated by shinnery oak and various scrub oak species. Other woody plants reported to

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occur in communities described by Wiedeman and Penfound, included sand sage, skunkbrush, western hackberry, yucca, and grapes. Grasses included primarily short and midgrass species, such as little bluestem, three-awns, hairy and blue grama, sandburs, and sand dropseed.

Shinnery oak communities in New Mexico have been described by several researchers conducting studies in this vegetation type. Davis et al. (1979) and Davis et al. (1981) described shinnery vegetation while researching lesser prairie chicken habitat requirements in the Mescalero Sands in northern Chaves county and around the town of Milnesand in Roosevelt county. A shinnery oak-tallgrass type was described in the Mescalero Sands. This type was further divided into three subtypes 1, 2 and 3. These subtypes were defined according to prominence of sand bluestem, with subtype 1 possessing the greatest basal area and subtype 3 the least. Cover of shinnery oak was similar between subtypes 1 and 2, whereas subtype 3 had higher cover. Common associate grasses included purple three-awn, hairy grama, little bluestem, and Hall's panicum.

Three shinnery oak types were recognized near Milnesand by Davis et al. (1981), including shinnery oak-bluestem, shinnery oak-midgrass, and sandhills. The shinnery oak-bluestem type was dominated by shinnery oak with an interspersed of grasses, primarily little and sand bluestem. The shinnery oak-midgrass type was comprised mainly of shinnery oak and several midgrass species, including gramas, dropseeds, and three-awns. The sandhills type was

characterized as active duneland vegetated primarily by shinnery oak with a sparse grass cover consisting of purple three-awn, hairy grama, fall witchgrass, and sand paspalum.

In Texas, shinnery oak communities were studied and classified by Sullivan (1980), who recognized three community types, designated A, B, and C. In addition, communities were further delineated and described within each of these types. Community type A, was characterized by active dune land and was considered an early succession and unstable community. Three sub-communities were recognized within this type: shinnery oak/Harvard panicum-giant sandreed, shinnery oak/Harvard panicum-giant dropseed, and shinnery oak/giant dropseed-Harvard panicum. Vegetation in these communities consisted primarily of shinnery oak, yucca, various tallgrasses, and annual forbs. Cover ranged from less than 5% in the shinnery oak/Harvard panicum-giant sandreed community to 80% in the shinnery oak/giant sandreed-Harvard panicum community. Soils were primarily Kermit fine sands.

Community type B was characterized by a level to undulating topography with occasional small blowouts. Numerous grass and forb species were present in this community type, however, shinnery oak was the most prominent species, forming large extensive mats, ranging in cover from 20 to 77%. Two communities were recognized: shinnery oak/sand dropseed-giant dropseed community, which occurred on generally flat topography, and shinnery oak/giant dropseed community, which occurred on undulating to hilly topography ranging

in slope from 5 to 30%. These communities occurred on Tivoli, Brownfield, Jalmar and Penwell fine sands.

Community type C was distinguished by the presence of honey mesquite. Only one community was recognized within this type, honey mesquite/shinnery oak/sand dropseed, however, several phases were delineated within this community. Differences in phases was related to depth of clay accumulation in the soil, with shallower, less sandy soils supporting increased densities of mesquite. Shinnery oak often occurred in broken motts in this community type and canopy cover was relatively low, ranging from 6 to 28%. Mesquite cover ranged from 8 to 16% in lower rainfall areas to 4 to 5% in higher rainfall areas. Soils were numerous, including: Brownfield, Triomas, Jalmar fine sands, Amarillo, Springer, Gomez loamy fine sands, and Amarillo fine sandy loam.

STUDY AREA

Research was conducted in Chaves, Eddy, Lea and Roosevelt counties of southeastern New Mexico. Climate of southeastern New Mexico is semi-arid, characterized by distinct seasons, wide ranges of diurnal temperatures, and plentiful sunshine. Average annual temperatures range from 14 C in northern Chaves county to 16 C in Eddy county. Precipitation ranges from 25 to 41 cm, with a general gradient of increased precipitation from the west to northeast. Nearly 85% of the precipitation falls from May to

Table 1. Soil associations supporting shinnery oak communities in southeastern New Mexico.

<u>Association</u>	<u>County</u>	<u>Percent of Survey Area</u>	<u>Soil Series</u>	<u>Percent</u>
Nutivoli-Jalmar-Faskin	Chaves (North)	1	Nutivoli	38
			Jalmar	24
			Faskin	22
			Other soils	16
Faskin-Roswell-Jalmar	Chaves (North)	25	Faskin	37
			Roswell	25
			Jalmar	14
			Other soils	24
Roswell-Faskin-Jalmar	Chaves (South)	10	Roswell	40
			Faskin	25
			Jalmar	15
			Other soils	20
			-Ima	
			-Simona	
			-Malstrone	
Berino-Pintura-Pajarito	Chaves (South)	5	-Dune land	
			Berino	40
			Pintura	10
			Pajarito	10
			Other soils	40
			-Cacique	
			-Tencee	
			-Simona	
Kermit-Berino	Eddy	17	-Jal	
			-Alma	
			Kermit	60
			Berino	30
			Other soils	10
			-Pajarito	
			-Wink	
			-Cacique	
Brownfield-Patricia-Tivoli	Lea	6	-Tonuco	
			-Dune land	
			Brownfield	30
			Patricia	20
			Tivoli	15
			Other soils	35
			-Springer	
			-Gomez	
			-Amarillo	
			-Arvana	
			-Sharvana	

Table 1 continued

Pyote-Maljamar-Kermit	Lea	26	Pyote	30
			Maljamar	20
			Kermit	15
			Other soils	35
			-Palomas	
Tivoli-Springer-Brownfield	Roosevelt	15	-Wink	
			-Largo	
			-Pajarito	
			-Tonuco	
			Tivoli	NA
			Springer	
			Brownfield	
			Arch	
			Potter	

October, corresponding with the growing season. Evaporation ranges from 244 to 279 cm per year.

Shinnery oak communities occur on numerous soil associations in southeastern New Mexico (Table 1). Complete descriptions of each soil series occurring in the formentioned associations are available in Soil Conservation Service soil surveys of Chaves, Eddy, Lea, and Roosevelt counties (USDA 1967, 1971, 1974, 1980a, 1980b, 1967).

Generally, the associations supporting shinnery oak communities are characterized by deep sandy and fine sand soils that are well to excessively drained. Permeability is moderate to rapid. The soils are highly susceptible to wind and water erosion, and actively moving dunes are present. Topography ranges from level to rolling, with slopes varying from 0 to 30 percent (USDA 1967, 1971, 1974, 1980a, 1980b).

METHODS

Sampling for classification of shinnery oak communities was completed in two phases. In August 1988, 194 shinnery oak stands were extensively sampled along a preplanned reconnaissance route. The goal of the reconnaissance was to familiarize the researcher with the study area and to formulate sampling methodology for the following growing season.

Location of the route was determined by potential of soils to support shinnery oak communities and the accessibility of those areas to a two wheel drive vehicle. Sample sites were located

approximately 1.6 km apart along the route where shinnery oak was present. At each site all flowering and prominent nonflowering species were recorded and assigned absolute cover class (Daubenmire 1959) and prominence (Poulton 1970) values. In addition, topographic position of the site, slope and aspect, and color of soil were noted.

Based upon the data collected during the reconnaissance, three major shinnery oak vegetation types were recognized: shinnery oak, tebuthiuron treated shinnery oak, and dune complex. In August and September 1989, shinnery oak and tebuthiuron treated shinnery oak areas were intensively sampled, whereas dune complex areas were extensively sampled as in 1988. Sample sites of the shinnery oak type were located 3.2 km apart, while tebuthiuron treated shinnery oak and dune complex areas were sampled when possible. At each stopping location a single plot was located randomly 100 m in one of eight potential directions (N, NW, W, SW, S, SE, E, NE).

Intensive sampling was conducted in $10 \times 20 \text{ m}^2$ macroplots. Four 20 m transect lines were located 2.5 m apart in each macroplot, with five $.5 \text{ m}^2$ rectangular microplots equidistantly located along each transect. Within each microplot several vegetation parameters were estimated or measured, including: foliar cover of grasses, forbs, shinnery oak, and snakeweed, ground cover of litter and bare ground, density of shinnery oak stems, and maximum height of shinnery oak. Foliar and ground cover was ocularly estimated by a single observer in a nested frame. Species

with cover less than 1% were assigned a value of trace (T). Density of shinnery oak stems was measured by counting individual stems on the left half of each frame, while maximum height was determined by measuring the tallest stem on the left half of the frame. In addition to the vegetation parameters recorded in the microplots, canopy cover of mesquite, sand sagebrush, yucca, and javelina bush occurring in the macroplot was measured and number of plants tabulated. Species occurring in the area, but not previously noted in the collection of data were listed as present and assigned a value of (P). Also, all species recorded were assigned a prominence value, based upon the index developed by Poulton (1970). Finally, for each macroplot, elevation, slope and aspect, and soils were noted. Soils were determined from soil surveys conducted by the Soil Conservation Service.

Data collected during the 1989 field season was analyzed with Bray-Curtis (1956) percent dissimilarity. Stands were compared based upon mean vegetation cover data. Compilation and mathematical analysis was achieved by use of the program CLUSTAR. Following completion of data analysis, the program arranged stands in a hierarchical, agglomerative dendrogram, according to similarity of stand vegetation. Communities were recognized by objectively breaking the resulting dendrogram into logical divisions. During the course of identification, stands which did not fit well into a respective community were moved to an appropriate one. Movement was minimized as much as possible to maintain the mathematical integrity of the analysis. Stands which did not fit any of the

communities were identified as potential communities in which insufficient data were collected to designate a separate community. Such stands were classified as stand/community and briefly described separately in the results section.

RESULTS

Key to shinnery oak plant communities

- 1a. *Bouteloua hirsuta* dominates the understory, *Quercus havardii* dispersed.
... *Prosopis glandulosa*/*Quercus havardii*/*Bouteloua hirsuta*-
Aristida purpurea community
- 1b. *Bouteloua hirsuta* not dominant, *Quercus havardii* may or may not be dispersed.
... go to 2.
- 2a. *Prosopis glandulosa* dominates, *Quercus havardii* a minor understory species.
... *Prosopis glandulosa*/*Quercus havardii*/*Aristida purpurea*-*Sporobolus* community
- 2b. *Prosopis glandulosa* may or may not be present but is not the dominant woody species.
... go to 3.
- 3a. *Andropogon hallii* or *Schizachyrium scoparium* a major component of the herbaceous layer.
... go to 4.
- 3b. *Andropogon hallii* or *Schizachyrium scoparium* may be present, but not abundant. Primary species are *Aristida* or *Sporobolus* spp.
... go to 6.
- 4a. *Gutierrezia sarothrae* a prominent woody species, primary grasses are *Schizachyrium scoparium* and *Aristida purpurea*
... *Quercus havardii*/*Gutierrezia sarothrae*/*Aristida purpurea*-*Schizachyrium scoparium* community.
- 4b. *Gutierrezia sarothrae* may be present, but only as a minor species. Primary grasses are tallgrasses or *Aristida*
... go to 5.
- 5a. *Schizachyrium scoparium* and *Andropogon hallii* codominant species. Shinnery oak cover greater than 30%.
... *Quercus havardii*/*Schizachyrium scoparium*-*Andropogon hallii* community
- 5b. *Andropogon hallii* or *Schizachyrium scoparium* co-dominates with *Aristida purpurea*. Shinnery oak cover less than 25%.
... *Quercus havardii*/*Aristida purpurea*-*Andropogon hallii* community

6a. Shinnery oak cover greater than 35%.

... Quercus havardii/Aristida purpurea-Sporobolus
cryptandrus community

6b. Shinnery oak cover less than 25%.

... Quercus havardii/Aristida purpurea-Lepteloma cognatum
community

Descriptive Legend to Shinnery Oak Community Types

Prosopis glandulosa/Quercus havardii/Bouteloua hirsuta-Aristida purpurea

This type is distinguish by a dominance of hairy grama, which gives the community a shortgrass appearance. The five samples included in this type were in southern Roosevelt, northern Lea, and eastern Chaves county.

Shinnery oak is the primary woody species in this community type, however, mean density (6.8 stems/m²) and cover (9.8%) are relatively low. Shinnery oak grows primarily in isolated motts or sparsely throughout the community. Snakeweed and mesquite are commonly associated species, however, several species may be present, including: Acacia greggi, Chryosthamnus pulchellus, Opuntia polyacantha, and plains yucca. Hairy grama is the dominant herbaceous species, with a mean coverage of 11.9%. Purple three-awn, sand dropseed, fall witchgrass, and sand paspalum are associated species. Several forbs may be present, including Commelina erecta, Commandra pallida, and Cryptantha jamesii.

Major species of this community and their constancy and mean coverage percentages are as follows:

<u>Species</u>	<u>Constancy</u> (%)	<u>Mean Coverage</u> (%)
<i>Aristida purpurea</i>	100	4.9
<i>Bouteloua curtipendula</i>	100	0.9
<i>Bouteloua hirsuta</i>	100	11.9
<i>Leptoloma cognatum</i>	100	1.4
<i>Paspalum setaceum</i>	100	1.1
<i>Sporobolus cryptandrus</i>	100	1.6
<i>Gutierrezia sarothrae</i>	100	4.4
<i>Prosopis glandulosa</i>	80	2.6
<i>Quercus havardii</i>	100	9.8
Bare ground		33.8
Litter		48.1

Soils of this community are higher in silt and clay content than other communities described. Textures are loamy fine sand and fine sandy loam. Stands were recorded on the following soil mapping units: Amarillo-Arvana loamy fine sands association, Amarillo loamy fine sand, Amarillo find sandy loam, Arvana loamy fine sand, and Faskin, moist-Douro association. Topography is level.

Prosopis glandulosa/Quercus havardii/Aristida purpurea-Sporobolus cryptandrus

This community type is among the most xeric studied, supporting isolated patches of vegetation within large areas of bare ground. This community can be distinguished by the dominant mesquite strata and scattered shinnery oak understory. This community generally has few herbaceous species. As few as three grasses were recorded with forbs often being absent. Samples were located in Lea, Eddy, and Chaves counties.

In contrast to all other shinnery oak community types, mesquite dominates among woody species in this community. Density of mesquite ranges from 50 to 250 plants/ha. Shinnery oak is isolated in small pockets (5.3 stems/m²), or widely dispersed. Canopy height of shinnery oak varies greatly throughout the stand. Mean heights in the sample stands ranged from 23.1 to 105 cm, with the mean maximum height being 39.5 cm. Other shrubs present include plains yucca and snakeweed. Purple three-awn is the dominant graminoid, ranging in cover from less than 1.0% to 5.0%. Sand dropseed was the only other graminoid with a constancy of 60%. Other grasses that may be locally abundant include black grama, fall witchgrass, and sandbur. Common forbs include Croton pottsii and Ambrosia psilostachya.

Constancy and mean coverage percentages of major species are as follows:

<u>Species</u>	<u>Constancy</u> (%)	<u>Mean Coverage</u> (%)
Aristida purpurea	93	1.6
Sporobolus cryptandrus	87	0.7
Prosopis glandulosa	100	10.7
Quercus havardii	100	6.2
Yucca campestris	87	0.6
Bare ground		41.5
Litter		47.6

Samples were located on find sand, and loamy find sand textures. Soil mapping units included: Berino complex, Faskin find sand, Kermit Palomas fine sands, Kermit soils and Dune land, Maljamar and Palomas find sands, Pajarito loamy find sand, Pyote

and Maljama fine sands, and Pyote soils and Dune land. Topography is primarily level to gently rolling, however, this community may occur on undulating dunes with slopes of 15%.

Quercus havardii/Aristida purpurea-Leptoloma cognatum

Distinguished by an open shinnery oak canopy with a herbaceous layer dominated by midgrass species, this community was the most common and widely sampled, occurring throughout the sample area with the exception of Roosevelt county. Considerable variation in cover values of dominant species was observed within this community type, therefore, several phases were recognized. Differences in species composition between phases are relatively small, and appear largely due to past grazing practices.

Overall this types is characterized by a relatively open shinnery oak stand (cover of 12.7%). The canopy is uniform in distribution, interrupted ocassionally by blowouts and small patches of bare ground. Mesquite may make up a substantial portion of the canopy in locations, but is often wide spread to absent. Yucca campestris and Artemesia filifolia are minor shrubs commonly found in stands. The herbaceous layer is dominated by purple three-awn, fall witchgrass, and sand dropseed, with Cenchus incertus and black grama being locally important. Forbs are a minor component of the community, being limited both in composition and coverage. Constancy and mean coverage values for the community are list below.

<u>Species</u>	<u>Constancy</u>	<u>Mean Coverage</u>
	(%)	(%)
Aristida purpurea	98	2.0
Lepteloma cognatum	90	1.0
Sporobolus cryptandrus	87	0.7
Quercus havardii	100	12.7
Yucca campestris	80	0.4
Bare ground		38.7
Litter		56.2

Three phases are recognized within this community. The first of these is a Prosopis glandulosa/Quercus havardii-Artemesia fillifolia/Aristida purpurea-Leptoloma cognatum phase. The "woodiest" of the phases, mesquite forms a tall shrub statum with shinnery oak, sand sagebrush, yucca, and snakeweed occuring as a understory shrub layer. Purple three-awn and fall witchgrass co-dominate in the herbaceous layer. Common associated species include: sand dropseed, sandbur, and black grama. Constancy and mean cover values of this phase are provided below:

<u>Species</u>	<u>Constancy</u>	<u>Mean Coverage</u>
	(%)	(%)
Aristida purpurea	100	1.9
Lepteloma cognatum	86	1.3
Sporobolus cryptandrus	100	0.7
Artemesia filifolia	71	1.3
Prosopis glandulosa	100	5.4
Quercus havardii	100	12.0
Yucca campestris	71	0.4
Bare ground		38.2
Litter		57.9

The second phase is Quercus havardii/Bouteloua eriopoda-Aristida purpurea. Shinnery oak is the primary shrub in this phase. Mesquite, yucca, and Ephedra antisiphilitica are minor associated shrub species. This phase is distinguished by the

abundance and constancy of black grama. Secondary grass species include purple three-awn, and sand dropseed. Species constancy and mean coverage values are listed below.

<u>Species</u>	<u>Constancy</u> (%)	<u>Mean Coverage</u> (%)
Aristida purpurea	100	1.9
Bouteloua eriopoda	100	3.6
Lepteloma cognatum	75	0.1
Sporobolus cryptandrus	100	1.4
Prosopis glandulosa	75	0.3
Quercus havardii	100	10.8
Yucca campestris	75	0.4
Bare ground		36.7
Litter		58.1

The third phase, Quercus havardii/Aristida purpurea-Leptoloma cognatum, had the greatest canopy coverage of shinnery oak and purple three-awn, whereas mesquite was uncommon to absent. Fall witchgrass and sand dropseed are secondary grass species. Species occurring in this phase with a constancy value greater than 60% include:

<u>Species</u>	<u>Constancy</u> (%)	<u>Mean Coverage</u> (%)
Aristida purpurea	98	2.0
Lepteloma cognatum	82	1.0
Sporobolus cryptandrus	83	0.6
Quercus havardii	100	12.8
Yucca campestris	79	0.3
Bare ground		39.4
Litter		56.8

Topography of the community ranges from level to undulating dunes with slopes up to 30%. Soils are primarily classified as sandy, loamy fine sand, and fine sands. Soil mapping units where stands were sampled include: Berino complex, Faskin-Malstrom association, Kermit-Palomas fine sands, Kermit soils and Dune land,

Pyote loamy fine sand, Pyote and Maljamar fine sands, Pyote soils and Dune land, Roswell fine sand, Roswell-Jalmar fine sands, and Stromal-Pyote fine sands.

Quercus havardii/Schizachyrium scoparium-Andropogon hallii

This community type occurs in northern Lea and southern Roosevelt counties in the Southern Great Plains physiographic region. The abundance of little and sand bluestem gives this community a tallgrass appearance with the shinnery oak substratum.

Shinnery oak is the primary woody species, with a mean coverage of 31.5%. The canopy is relatively tall (mean maximum height of 40.8 cm) and dense (14 stems/m²). Yucca and snakeweed are both minor, common species. The herbaceous layer is dominated by little bluestem, with sand bluestem, sand paspalum, hairy grama, and purple three-awn being important associate species. Forbs are relatively abundant in this community with a mean average of nearly 5 species per stand. The most common species include: Commelina erecta, Oryzanthra jamesii, and Commandra pallida.

Major species of this community and their constancy and mean coverage values are as follows:

<u>Species</u>	<u>Constancy</u> (%)	<u>Mean Coverage</u> (%)
Andropogon hallii	100	1.8
Aristida purpurea	100	1.2
Bouteloua hirsuta	100	1.4
Eragrostis secundiflora	60	0.4
Leptoloma cognatum	60	0.1
Paspalum setaceum	100	1.8
Schizabhyrium scoparium	100	5.2
Sporobolus cryptandrus	100	0.4
Gutierrezia sarothrae	60	0.1
Quercus havardii	100	31.5
Yucca campestris	100	0.2
Bare ground		30.3
Litter		62.0

Soils textures are entirely fine sands, however, this type occurs on various soil mapping units, including: Amarillo-Gomez, brownfield, Brownfield-Patricia, and Tivoli fine sands. Topography is level to gently sloping with occasional, small, stabilized dunes.

Quercus havardii/Gutierrezia sarothrae-Schizabhyrium scoparium-Aristida purpurea

This community is distinguished by an abundance of snakeweed. The community has an appearance of a relatively open shinnery oak canopy with a mixed grass herbaceous layer. Number of species per stand was greatest in this community, with a mean of 20. Sample stands were located in northern Lea, eastern Chaves, and southern Roosevelt counties.

The shinnery oak canopy is moderate in coverage (18.6%) and density (11.2 stems/m²). Most notable among the woody species is the abundance of snakeweed, which has a cover of 3.6%. This represented the highest mean coverage of snakeweed for communities

described. The herbaceous layer is co-dominated by little bluestem and purple three-awn. Numerous associated species occur in the community, with seven other grasses having constancy values of 60%. Forbs are relatively abundant, averaging seven species per stand. Among the most common are *Commandra pallids*, *Ambrosia psilostachya*, and *Cryptantha jamesii*.

<u>Species</u>	<u>Constancy</u>	<u>Mean Coverage</u>
	(%)	(%)
<i>Andropogon hallii</i>	75	1.0
<i>Aristida purpurea</i>	100	3.4
<i>Bouteloua curtipendula</i>	75	0.4
<i>Bouteloua hirsuta</i>	100	1.5
<i>Eragrostis secundiflora</i>	100	1.3
<i>Leptoloma cognatum</i>	75	0.2
<i>Paspalum setaceum</i>	100	1.9
<i>Schizachyrium scoparium</i>	100	3.6
<i>Sporobolus cryptandrus</i>	100	0.5
<i>Gusa</i>	100	3.6
<i>Quercus havardii</i>	100	18.6
<i>Commandra pallida</i>	100	2.0
Bare ground		30.6
Litter		60.4

Soils of this community type consist of three different textures, find sand, loamy fine sand, and find sandy loam. Soil mapping units include: Amarillo loamy fine sand, Brownfield fine sand, Douro-Faskin, moist association, and Tivoli find sand. Topography is level to gently rolling.

Quercus havardii/*Aristida purpurea*-*Sporobolus cryptandrus*

This community type occurs primarily on localized dunes in southern Roosevelt and northern Lea counties. Interspersed in *Quercus havardii*/*Schizachyrium scoparium*-*Andropogon hallii* and *Quercus havardii*-*Gutierrezia sarothrae*/*Schizachyrium scoparium*-*Aristida purpurea* types, this community is distinguished by an

abundance of shinnery oak and limited coverage of grasses.

Shinnery oak occurs as a dense (26.8 stems/m²) closed canopy in this community. Cover in the four stands ranged from 41% to 55%. Shinnery oak dominates almost to the exclusion of a herbaceous component. Purple three-awn is the most prevalent graminoid, with little bluestem, sand dropseed, and sand ~~paspalum~~ being common associate species. Based upon the location of this community, it would appear tallgrass species have been greatly reduced by past grazing. Tallgrass species, sand bluestem and giant dropseed, occasionally occur as minor components. Forbs are of minor importance in this community, with a mean of 2 species per sample stand.

Constancy and mean coverage values of this community are as follows:

<u>Species</u>	<u>Constancy</u> (%)	<u>Mean Coverage</u> (%)
Aristida purpurea	100	1.9
Paspalum setaceum	75	0.3
Scizachyrium scoparium	75	0.6
Sporobolus cryptandrus	100	0.6
Quercus havardii	100	46.0
Bare ground		30.4
Litter		66.2

Soils were fine sand and loamy fine sand in texture. Soil mapping units include: Gomez loamy fine sand, Roswell-Jalmar fine sands, and Tivoli fine sand. Topography was rolling to undulating with slopes ranging from 7% to 30%. Small blowouts were present in some of the stands.

Quercuse havardii/Aristida purpurea-Andropogon hallii

This community is an innerspersion of tall and mixed grass species. Considerable variation in abundance of grasses may occur within this community, apparently due to grazing influence. In appearance shinnery oak dominates the landscape with sand and little bluestem culms rising through the canopy. This community was primarily sampled in the Mescalero Sands area in Chaves county, but stands were noted as far as southern Lea and Roosevelt counties.

The shineery oak canopy is evenly distributed throughout the community, being interrupted by ocassional blowouts, which may be several meters in circumference. Density (11.6 stems/m^2) and height of canopy (35.9 cm) are approximately in the middle of the range exhibited throughout the study area. Mesquite is generally absent, however, it may be found in very localized areas. Other common shrubs include yucca and sand sagebrush. Composition of grasses is relatively constant in this community, with sand and little bluestem, purple three-awn, hairy grama, and sand paspalum consistantly bieng the most abundant species. As noted previously, cover values vary gretly, with sand and little bluestem dominating in climax stands, as identified in SCS ecological monitoring guides. Purple three-awn is most prevalent in areas of lower ecological condition. Constancy and cover values of species in this stand are listed below.

<u>Species</u>	<u>Constancy</u> (%)	<u>Mean Coverage</u> (%)
Andropogon halli	93	1.0
Aristida purpurea	100	1.8
Bouteloua hirsuta	78	1.5
Paspalum setaceum	93	0.5
Schizachyrium scoparium	78	2.1
Sporobolus cryptandrus	100	0.4
Artemesia filifolia	64	0.7
Quercus havardii	100	20.7
Yucca campestris	86	0.4
Bare ground		36.5
Litter		57.2

Samples in this community occurred on fine sand texture soils of the following soil mapping units: Brownfield fine sand, Faskin-Malstrom association, Jalmar-Roswell-Pyote association, Kermit soils and Dune land, Roswell fine sand, Roswell-Jalmar fine sands, and Stromal-Faskin-Malstrom fine sands. Topography varied from level to undulating dunes with slopes of 17%. Blowouts are a common physical feature of this community.

OUTLIER STANDS/COMMUNITIES

Quercus havardii/Schizachyrium scoparium-Panicum havardii

This stand was considered as a separate community based upon the presence of Panicum havardii. In Texas, Sullivan described three communities in which Havard panicum was a major component. It is unclear whether this community is not as widely distributed in New Mexico as that reported in Texas or whether it was simply missed in the sampling process. The single stand was located in northern Chaves county in a rugged dune area with slopes greater than 30%.

Shinnery oak dominated the site with a canopy cover of 32%, falling within the range reported for shinnery oak cover in Texas. Species composition was similar between this study and that reported by Sullivan, however, some variation occurred in cover values. Little and sand bluestem were the primary grasses in the sample, with cover values of 4.9% and 2.4%, respectively. Havard panicum cover was less than 1%. Other common species included purple three-awn, sand paspalum, and sporobolus cryptandrus. The soil mapping unit was Roswell fine sand.

Prosopis glandulosa/Quercus havardii/Chloris cucullata-Setaria macrostachya

This stand was unique in location and the species present. Located on the very western edge of the Llano Estecado in Chaves county, it appears to be a transitional area between a shinnery oak and mesquite grassland type. This stand was characterized by small mound shaped dunes covered by shinnery oak and grasses. Interdune space was vegetated primarily by mesquite.

This stand was among the most diverse sampled in both the number of species and variety of species. As previously noted, shinnery oak was localized on dune areas. Shinnery oak cover was 24%. No grass clearly dominated in coverage, however, Chloris cucullata and Setaria macrostachya were most prominent. Both of these species had cover values of less than 2%. Other common graminoids included Cenchrus incertus, Panicum obtusum, Sporobolus contractus, Sporobolus cryptandrus, and Sporobolus flexuosus. Several forbs were also recorded in the stand, among the most

common were *Croton pottsii*, *Euphorbia* spp., and *Phyllanthus abnormis*.

Prosopis glandulosa/*Microhammus ericoides*-*Quercus havardii*/*Aristida purpurea*-*Sporobolus cryptandrus*

Two stands were sampled within this community. Limited in area, this community appeared to be at the ecological limit of shinnery oak growth. Both stands were located in transitional areas between shinnery oak and mesquite communities. Stands were sampled in eastern Eddy county, but similar vegetation composition was observed in Chaves county.

These stands were characterized by an open mesquite canopy, with an understory of javelina bush, shinnery oak and several other woody species. Composition and coverage of grasses varied widely between sites. Purple three-awn was among the most prevalent at both sites, with cover ranging from approximately 2% to 7%. Other species present in both stands were: black grama, *Panicum obtusum*, and sand dropseed. *Croton pottsii* had a canopy of about 1% in the two stands.

Soils were unique among stands supporting shinnery oak, having caliche cobbles at the surface. Stands were located in Berino-Dune land complex and Kermit-Berino fine sands. Topography was level to gently sloping.

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